REMARKS

In the present Amendment, claim 6 has been amended to recite that the semiconductor multilayer film including an active layer is the recited group III nitride semiconductor multilayer film. No new matter has been added, and entry of the Amendment is respectfully requested.

Claims 1-4, 6-9 and 11 are pending.

In paragraph No. 1 of the Action, claim 6 is objected to because, per the Examiner, at the end of line 4, "group III nitride" should be inserted after "the."

As noted, claim 6 has been amended to address the Examiner's concern. Withdrawal of the objection to claim 6 is requested.

In paragraph No. 3 of the Action, claims 1-4, 6-9 and 11 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tadatomo et al (U.S. 6,225,650) in view of Motoki et al (U.S. 2003/0145783).

Applicants submit that this rejection should be withdrawn because Tadatomo et al and Motoki et al do not disclose or render obvious the present invention, either alone or in combination.

In the Amendment filed April 21, 2008, Applicants explained that it is not clear from the disclosure of Motoki et al whether the presence of the polycrystalline material on the mask film has effects on the dislocation density.

In response, the Examiner asserts:

> The low dislocation density GaN substrate shown in Fig. 10(5) of Motoki et al. is used to replace the GaN substrate (1) shown in Figs. 4 and 9(a) of Tadatomo et al., and the mask structure (23) shown in Fig. 5 of Motoki et al. is used to replace the mask (2) shown in Figs. 4 and 9(a) of Tadatomo et al., and therefore

> Applicants' argument regarding relation between the presence of the polycrystalline material and the dislocation density is irrelevant to the above rejections, because Applicants do not claim dislocation density in the group III nitride semiconductor multilayer film.

Applicants also explained that in Motoki et al, GaN crystals are grown on an undersubstrate 41, wherein the material of the undersubstrate is sapphire (Embodiment 1), GaAs (Embodiments 2 and 3), as well as O and P (Embodiment 4). Still further, Applicants pointed out that Motoki et al does not teach or suggest that a Group III nitride crystal is grown on a Group III nitride substrate. In response, the Examiner states:

> The low dislocation density GaN substrate in Fig. 10(5) of Motoki et al. is used to replace the GaN substrate disclosed by Tadatomo et al., and a group III nitride crystal grown on a group III nitride substrate is disclosed in Tadatomo et al.

Applicants respectfully disagree.

Firstly, Applicants are relying upon the unexpectedly superior results (decreased dislocation density) provided by the present invention to establish the patentability of the present invention. There is no requirement under the law the unexpectedly superior results be recited in the claims.

Secondly, the substrate 1 shown in Figs. 4 and 9(a) of Tadatomo et al is not "GaN substrate" as asserted by the Examiner.

The material of the base substrate 1 in Tadatomo et al may be, for example, sapphire crystal, rock crystal, SiC and the like (col. 4, lines 12-14).

Tadatomo et al disclose that "the substrate may have a buffer layer of ZnO, MgO, AlN and the like on its surface to reduce the difference in the lattice constant and coefficient of thermal expansion between the substrate and GaN group crystal layer (col. 4, lines 16-20)."

From the above description, it is clear that the substrate has a different lattice constant and coefficient of thermal expansion from the GaN group crystal layer. Therefore, the substrate of Tadatomo et al is not GaN.

Further, in Figs. 4 and 9 of Tadatomo et al, the dislocation lines in the GaN layer 3 develop from the interface between the substrate 1 and the GaN layer 3.

However, in case that a GaN group crystal layer is grown on a GaN substrate, the grown GaN crystal layer would not have dislocation which is newly generated at the interface between the substrate and grown GaN group crystal, because the grown GaN crystal layer and the GaN substrate have the same lattice constant and coefficient of the thermal expansion. Therefore, the substrate of Tadatomo et al is not GaN.

It is unreasonable to replace "the GaN substrate (1) shown in Figs. 4 and 9(a) of Tadatomo" with "the low dislocation density GaN substrate shown in Fig. 10(5) of Motoki" as asserted by the Examiner, because they are <u>not</u> the same or equivalent.

Although the "GaN substrate shown in Fig. 10(5) of Motoki et al" is called "substrate," it is not the same as or equivalent to the base substrate 1 in Tadatomo et al.

Motoki et al discloses a GaN substrate as a final product obtained by growing a GaN crystal on an undersubstrate 41, wherein the material of the undersubstrate is sapphire (Embodiment 1), GaAs (Embodiments 2 and 3), as well as O and P (Embodiment 4), as shown in Fig. 10(5).

In contrast, Tadatomo et al discloses in Figs. 4 and 9(a) that an additional layer such as a second GaN group crystal layer 31 in Fig. 4 and semiconductor layers k in Fig. 9(a) are grown on a GaN group crystal layer 3 which is provided on a substrate 1 other than GaN, such as sapphire and the like, wherein the additional layers are grown without removing the substrate (with the substrate remaining under the GaN group crystal layer 3).

Motoki et al merely disclose that the polycrystalline material on the mask film does not have effects on the dislocation density, in case that a Group III nitride crystal (e.g. GaN) is grown on a substrate which is other than the Group III nitride, e.g. sapphire, GaAs and the like.

Since the mechanism of dislocation generation in above cases is different from that in case a Group III nitride crystal is grown on a substrate of a Group III nitride, it is not clear from the disclosure of Motoki et al that the polycrystalline material on the mask film has effects on the dislocation density, in case that a Group III nitride crystal is grown on a substrate of a Group III nitride.

In response to Applicants' argument that Tadatomo et al does not teach or suggest that a Group III nitride semiconductor substrate is used for growth of the Group III nitride such as GaN crystal, the Examiner states:

> Tadatomo et al further disclose that a GaN crystal (1 in Figs. 9(a) and 10(a)) (col. 8, lines 57-58) can be a group III nitride semiconductor substrate for growing GaN crystal (3).

Applicants respectfully disagree.

As explained above, the substrate 1 in Fig. 9 (a) of Tadatomo et al is not a GaN substrate.

With respect to the substrate 1 in Fig. 10(a) of Tadatomo et al, the substrate 1 is a GaN substrate, and Fig. 10(a) shows a GaN group LED having a GaN substrate. However, Fig. 10(a)

does not show a mask layer on the GaN substrate to obtain a grown GaN crystal having low dislocations. Fig. 10(a) merely shows a general explanation of width D of the element and the width E of the active part k1 of a GaN group LED.

Applicants further explained that the significant effects of the present invention are shown in Examples 1-6 of the present specification. However, the Examiner contends that Applicants do not claim the significant effects of the present invention.

With due respect, the Examiner's contention is not reasonable, because Applicants are relying upon the unexpectedly superior results provided by the present invention to establish the patentability of the present invention. There is no requirement under the law the unexpectedly superior results be recited in the claims.

The presently claimed nitride semiconductor substrate is based on the premise that a group III nitride semiconductor substrate having a dislocation density in the vicinity of the surface thereof of $1 \times 10^7/cm^2$ or less is used. In cases where such a substrate is used, Applicants have found that the following problems are caused, based on their investigation as described at page 4, line 13 to page 6, line 13 of the present specification:

When a mask is provided on a low dislocation substrate and a group III nitride semiconductor is grown thereon, many dislocations develop from the vicinity of the mask (page 6, lines 21-23 of the specification), and the development of this type of dislocation is marked when a substrate having a low dislocation density is used (page 6, lines 24-25).

These phenomena become more apparent for a substrate in which dislocations have been reduced to less than $10^7/cm^2$ (page 6, lines 26-27 of the specification).

That is, in case that a group III nitride semiconductor is grown on a substrate having a low dislocation density, many dislocations develop from the vicinity of the mask.

According to the presently claimed invention, the above problems are solved by using a polycrystalline material deposited on the surface of the mask.

In view of the above, it would not have been obvious to those skilled in the art that a nitride semiconductor substrate comprising a low dislocation density, and multilayer mask structure including a polycrystalline material, may be employed to improve device characteristics, since Tadatomo et al and Motoki et al do not disclose or suggest all the limitations of the claims.

Accordingly, reconsideration and withdrawal of the § 103(a) rejection based on Tadatomo et al in view of Motoki et al are respectfully requested.

Allowance is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

Hui Chen Wauters

Hui C. Wauters
Registration No. 57,426

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

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